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**Principal Investigator:** Iliev, Plamen .

**Award ID:** 1011709

**Organization:** GA Tech Res Corp - GIT

**Submitted By:**

Iliev, Plamen - Principal Investigator

**Title:**

Conference on Bifurcation Theory, Integrable Systems and the Bispectral Problem

### **Project Participants**

**Senior Personnel**

**Post-doc**

**Graduate Student**

**Undergraduate Student**

**Technician, Programmer**

**Other Participant**

**Research Experience for Undergraduates**

### **Organizational Partners**

### **Other Collaborators or Contacts**

### **Activities and Findings**

### **Journal Publications**

### **Books or Other One-time Publications**

### **Web/Internet Site**

**URL(s):**

<http://www4.ncsu.edu/~bnbakalo/sofia2010.html>

**Description:**

The website was created for the conference. It contains detailed information about the conference and abstracts of all talks.

### **Other Specific Products**

### **Contributions**

**Conference Proceedings**

**Categories for which nothing is reported:**

Organizational Partners

Activities and Findings: Any Research and Education Activities

Activities and Findings: Any Findings

Activities and Findings: Any Training and Development

Activities and Findings: Any Outreach Activities

Any Journal

Any Book

Any Product

Any Contribution

Any Conference

**CONFERENCE ON BIFURCATION THEORY INTEGRABLE SYSTEMS AND  
THE BISPECTRAL PROBLEM  
DMS-1011709: FINAL REPORT**

PI: Plamen Iliev (Georgia Institute of Technology)  
co-PIs: Bojko Bakalov (North Carolina State University)  
Milen Yakimov (Louisiana State University)

INTRODUCTION

The conference took place at Sofia University (Sofia, Bulgaria). Staff support, lecture rooms, presentation equipment and refreshments were provided by the Faculty of Mathematics and Informatics at Sofia University.

The conference started on May 15 and ended on May 19, 2010. Most of the participants arrived on May 14. There were 63 participants from 13 countries. Of those participants, 7 were graduate students and 9 were female. The scientific program included 33 lectures on different aspects of bifurcation theory, integrable systems and the bispectral problem. This led to a lively exchange of ideas and interaction across fields. In particular, we believe that the meeting had helped creating many new contacts and hopefully had enhanced future collaborations between Bulgarian and American mathematical scientists.

Detailed information about the conference (including abstracts of all talks) is available at the following website: <http://www4.ncsu.edu/~bnbakalo/sofia2010/info.html>

In this report we have included the following information:

- (1) List of the participants and their affiliation;
- (2) The program of the conference;
- (3) Complete accounting of the use of NSF funds.

1. PARTICIPANTS AND AFFILIATION

- (1) Iana Anguelova (Stony Brook University, USA)
- (2) Bojko Bakalov (North Carolina State University, USA)
- (3) Marcin Bobiński (University of Warsaw, Poland)
- (4) Alexey Borisov (Scientific and Publishing Center Regular and Chaotic Dynamics, Izhevsk, Russia)
- (5) Catherine Buell (grad. student, North Carolina State University, USA)
- (6) Oleg Chalykh (University of Leeds, UK)
- (7) Ognyan Christov (Dept. of Mathematics, Sofia University, Bulgaria)
- (8) Johann Davidov (Institute of Mathematics, Bulgarian Academy of Sciences, Sofia, Bulgaria)
- (9) Hristo Dimov (Dept of Physics, Sofia University, Bulgaria)
- (10) Vladimir Dobrev (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (11) Vladimir Dragovic (Mathematical Institute, Serbian Academy of Sciences and Arts, Serbia)
- (12) Nicholas Ercolani (University of Arizona, USA)
- (13) Alexander Ganchev (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (14) Lubomir Gavrilov (University of Toulouse, France)
- (15) Joel Geiger (grad. student, Louisiana State University, USA)

- (16) Vladimir Gerdjikov (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (17) Iain Gordon (University of Edinburgh, UK)
- (18) Dimitar Grantcharov (University of Texas at Arlington, USA)
- (19) Alberto Grünbaum (University of California, Berkeley, USA)
- (20) Gerard Helminck (University of Amsterdam, The Netherlands)
- (21) Loek Helminck (North Carolina State University, USA)
- (22) Emil Horozov (Dept. of Mathematics, Sofia University, Bulgaria)
- (23) Ivan Horozov (Universität Tübingen, Germany)
- (24) Iliya D. Iliev (Institute of Mathematics, Bulgarian Academy of Sciences, Sofia, Bulgaria)
- (25) Plamen Iliev (Georgia Institute of Technology, USA)
- (26) Yulij Ilyashenko (Cornell University, USA, and Steklov Math Institute, Russia)
- (27) Stefan Ivanov (Dept. of Mathematics, Sofia University, Bulgaria)
- (28) Artur Kirkoryan (grad. student, Dept. of Mathematics, Sofia University, Bulgaria)
- (29) Vassil Kanev (University of Palermo, Italy)
- (30) Dimitar Kodjabachev (grad. student, Dept. of Mathematics, Sofia University, Bulgaria)
- (31) Nikolay Kolev (Dept. of Mathematics, Sofia University, Bulgaria)
- (32) Assen Kyuldjiev (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (33) Nikolay Kostov (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (34) Joceline Lega (University of Arizona, USA)
- (35) Roni Levi (Dept. of Mathematics, Sofia University, Bulgaria)
- (36) Katie Liszewski (grad. student, North Carolina State University, USA)
- (37) Ivan Mamaev (Institute of Computer Science, Izhevsk, Russia)
- (38) Pavao Mardesic (Université de Bourgogne, France)
- (39) Yavor Markov (Institute of Mathematics, Bulgarian Academy of Sciences, Sofia, Bulgaria)
- (40) Todor Milanov (University of Michigan, Ann Arbor, USA)
- (41) Vladimir Mitankin (grad. student, Dept. of Mathematics, Sofia University, Bulgaria)
- (42) Ivaïlo Mladenov (Institute of Biophysics, Bulgarian Academy of Sciences, Sofia, Bulgaria)
- (43) Oleg Mushkarov (Institute of Mathematics, Bulgarian Academy of Sciences, Sofia, Bulgaria)
- (44) Nikolay M. Nikolov (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (45) Petko Nikolov (Dept. of Physics, Sofia University, Bulgaria)
- (46) Emil Nissimov (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (47) Dmitry Novikov (Weizmann Institute of Science, Israel)
- (48) Svetlana Pacheva (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (49) Valentina Petkova (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (50) Emma Previato (Boston University, USA)
- (51) Radoslav Rashkov (Dept. of Physics, Sofia University, Bulgaria)
- (52) Tudor Ratiu (Ecole Polytechnique Federale de Lausanne, Switzerland)
- (53) Tsvetana Stoyanova (Dept. of Mathematics, Sofia University, Bulgaria)
- (54) Doychin Tolev (Dept. of Mathematics, Sofia University, Bulgaria)
- (55) Ivan Todorov (Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria)
- (56) Pierre van Moerbeke (Brandeis University, USA, and Université Catholique de Louvain, Belgium)
- (57) Veneta Vapirova (grad. student, Dept. of Mathematics, Sofia University, Bulgaria)
- (58) Alexander Varchenko (University of North Carolina, USA)
- (59) Alexander Veselov (Loughborough University, UK)
- (60) Milen Yakimov (Louisiana State University, USA)
- (61) Yosef Yomdin (Weizmann Institute of Science, Israel)
- (62) Angel Zhivkov (Dept. of Mathematics, Sofia University, Bulgaria)
- (63) Henryk Zoladek (University of Warsaw, Poland)

## 2. PROGRAM

**Saturday, May 15**

Time	Speaker/Title
8:40-9:30am	Ivan Todorov <i>Four dimensional vertex algebras and conformal field theory models</i>
9:40-10:30am	Yulij Ilyashenko <i>Limit cycles of quadratic vector fields: survey of some new results</i>
10:30-11:00am	Coffee break
11:00-11:50am	Nicholas Ercolani <i>Some new developments in 2D quantum gravity</i>
11:50-1:30pm	Lunch break
1:30-2:10pm	Dmitry Novikov <i>Infinitesimal Hilbert 16th problem: effective upper bounds</i>
2:20-3:00pm	Vladimir Dobrev <i>Intertwining operator realization of non-relativistic holography</i>
3:00-3:30pm	Coffee break
3:30-4:10pm	Valentina Petkova <i>Topological defects in Liouville theory</i>
4:20-5:00pm	Radoslav Rashkov <i>On some integrable structures in string/gauge theory duality</i>
5:10-5:50pm	Iana Anguelova <i>Twisted and quantum vertex algebras via enhanced <math>(A, H, S)</math> vertex algebras</i>

**Sunday, May 16**

Time	Speaker/Title
8:40-9:30am	Pierre van Moerbeke <i>Non-intersecting Brownian motions, critical diffusions and integrable systems</i>
9:40-10:30am	Alexander Varchenko <i>Quantum integrable model of an arrangement of hyperplanes</i>
10:30-11:00am	Coffee break
11:00-11:50am	Iain Gordon <i>Generalized Calogero–Moser spaces and Hecke algebras</i>
11:50-1:30pm	Lunch break
1:30-2:10pm	Yosef Yomdin <i>Center-focus problem for Abel equation, moment vanishing problem, and reconstruction of semi-algebraic sets from moment measurements</i>
2:20-3:00pm	Pavlo Mardesic <i>Darboux relative exactness and pseudo-abelian integrals</i>
3:00-3:30pm	Coffee break
3:30-4:10pm	Henryk Zoladek <i>Application of the WKB method in some hypergeometric equations which arise in number theory</i>
4:20-5:00pm	Iliya D. Iliev <i>Stability of periodic traveling waves and abelian integrals</i>
5:10-5:50pm	Marcin Bobiński <i>On the reduction of the degree of linear differential operators</i>
7pm	Conference dinner

**Monday, May 17**

Time	Speaker/Title
8:40-9:30am	Tudor Ratiu <i>Variational principles, liquid crystals, control, and imaging</i>
9:40-10:30am	Alexander Veselov <i>On pole configurations of monodromy-free potentials</i>
10:30-11:00am	Coffee break
11:00-11:40am	Joceline Lega <i>Spectral stability of local deformations of an elastic filament</i>
11:50-12:30pm	Alexey Borisov and Ivan Mamaev <i>Multiparticle systems. Algebra of integrals</i>
Afternoon	sightseeing / discussions

**Tuesday, May 18**

Time	Speaker/Title
8:40-9:30am	F. Alberto Grünbaum <i>Matrix valued Szego orthogonal polynomials and quantum random walks</i>
9:40-10:30am	Emma Previato <i>Sigma-function solutions of the Toda lattice</i>
10:30-11:00am	Coffee break
11:00-11:50am	Oleg Chalykh <i>Bispectral operators and Calogero–Moser spaces</i>
11:50-1:30pm	Lunch break
1:30-2:10pm	Dimitar Grantcharov <i>Highest weight modules of the quantum queer superalgebra</i>
2:20-3:00pm	Todor Milanov <i>Simple elliptic singularities and quasi-modular forms</i>
3:00-3:30pm	Coffee break
3:30-4:10pm	Ivan Horozov <i>Refinement of the Parshin symbol for surfaces</i>
4:20-5:00pm	Stefan Ivanov <i>Extremals for the Sobolev inequality on the quaternionic Heisenberg group and the quaternionic contact Yamabe problem</i>

**Wednesday, May 19**

8:40-9:20am	Loek Helminck <i>The algebraic and geometric structure of multicomponent Toda hierarchies, part 1</i>
9:30-10:10am	Gerard Helminck <i>The algebraic and geometric structure of multicomponent Toda hierarchies, part 2</i>
10:10-10:40am	Coffee break
10:40-11:20am	Vladimir Dragovic <i>Pencil of conics, Darboux coordinates, and a new view on the Kowalevski top</i>
11:30-12:10pm	Vassil Kanev <i>Unirationality of Hurwitz spaces of coverings of degree <math>\leq 5</math></i>
12:10-1:30pm	Lunch break
1:30-2:10pm	Tsvetana Stoyanova <i>An application of the Morales–Ramis theorems to Painlevé transcendents</i>
2:20-3:00pm	Doychin Tolev <i>Kloosterman sums and the distribution of squarefree numbers</i>

**3. ACCOUNTING OF THE NSF FUNDS**

We used the grant to support 17 participants from US. Of those participants, 3 were graduate students and 5 were female. The table below shows the level of support for each of the US participants. We use the following abbreviations: IS = Invited Speaker, O = Organizer, GS = Graduate Student. In the allocation of funds we gave preference to graduate students, junior faculty, and researchers without other support available.

<b>Participant</b>	<b>Institutional Address</b>	<b>Level of Support</b>
Anguelova, Iana (IS)	Stony Brook University	1,287.80
Bakalov, Bojko (O)	North Carolina State University	1,446.00
Buell, Catherine (GS)	North Carolina State University	1,820.41
Ercolani, Nicholas (IS)	University of Arizona	1,608.64
Geiger, Joel (GS)	Louisiana State University	1,450.00
Grantcharov, Dimitar (IS)	University of Texas, Arlington	1,588.00
Grunbaum, Alberto (IS)	University of California, Berkeley	2,569.12
Helminck, Aloysius (IS)	North Carolina State University	1,501.21
Iliev, Plamen (O)	Georgia Tech	1,200.00
Ilyashenko, Yulij (IS)	Cornell University	1,275.80
Lega, Joceline (IS)	University of Arizona	1,223.30
Liszewski, Katie (GS)	North Carolina State University	1,496.30
Milanov, Todor (IS)	University of Michigan, Ann Arbor	1,500.00
Previato, Emma (IS)	Boston University	1,648.00
van Moerbeke, Pierre (IS)	Brandeis University	485.00
Varchenko, Alexander (IS)	University of North Carolina at Chapel Hill	1,200.00
Yakimov, Milen (O)	Louisiana State University	1,500.00
<b>Total</b>		<b>24,799.58</b>
<b>NSF Funding</b>		<b>24,800.00</b>